



PLANT-BASED FOOD

to respond to
global challenges

WHY & HOW
?

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INTRODUCTION

Humanity is facing issues in which **human health** and the **health of the planet** can no longer be regarded as being separate from one another.

Today, we are all aware of the greatest challenge: **feeding people adequately** not only from a nutritional point of view, but also sustainably, bearing in mind the ever-growing global population.

Including more **plant-based foods in the diet** (fruit & vegetables, pulses, whole grains, nuts and seeds) now appears to be essential in meeting these challenges to ensure human and global health, as evidenced by the many **current dietary recommendations**.

However, simply knowing what to do is not enough, **we need the food supply to evolve** and we must encourage people to **change their behaviour**, specifically by adopting a diet rich in plant-based foods.

This **WHITE PAPER** takes stock of the situation, looks at **the nutritional challenges** from a sustainable point of view, and illustrates actions and initiatives that can concretely be implemented to **PROMOTE A DIET WITH MORE PLANT-BASED FOODS!**

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PART I

A plant-based diet at the crossroads of global issues

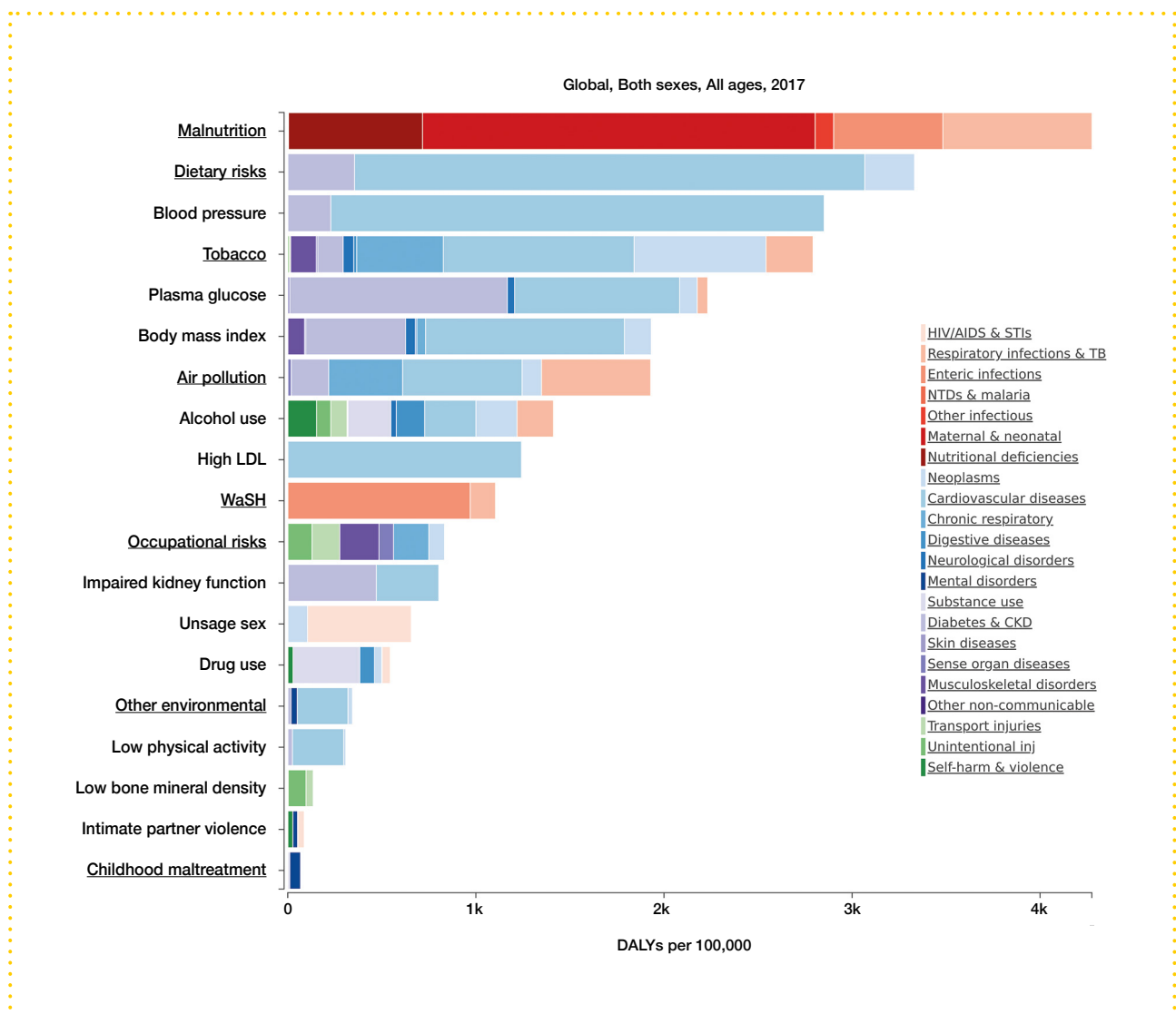


1. Nutrition and health challenges

The *Global Burden of Disease (GBD)* project led by the University of Washington offers an overview, but also a detailed description of the different **risk factors that affect disability-adjusted life expectancy**. The latter takes into account not only the number of years lived, but also the years of illness or various disabilities that affect the quality of life (the so-called DALYs - *Disability Adjusted Life Years* - or the number of healthy years lost). It allows us to develop a true **global atlas of health**¹.

Globally, the **two main identified risk factors** that reduce disability-adjusted life expectancy are dietary factors: **malnutrition** on the one hand, and **dietary risks** on the other. Other risk factors, such as high blood pressure and high fasting blood glucose, which are also linked to diet, further increase the impact of our food intake and dietary habits on our overall health².

MAIN RISK FACTORS that reduce disability-adjusted life expectancy

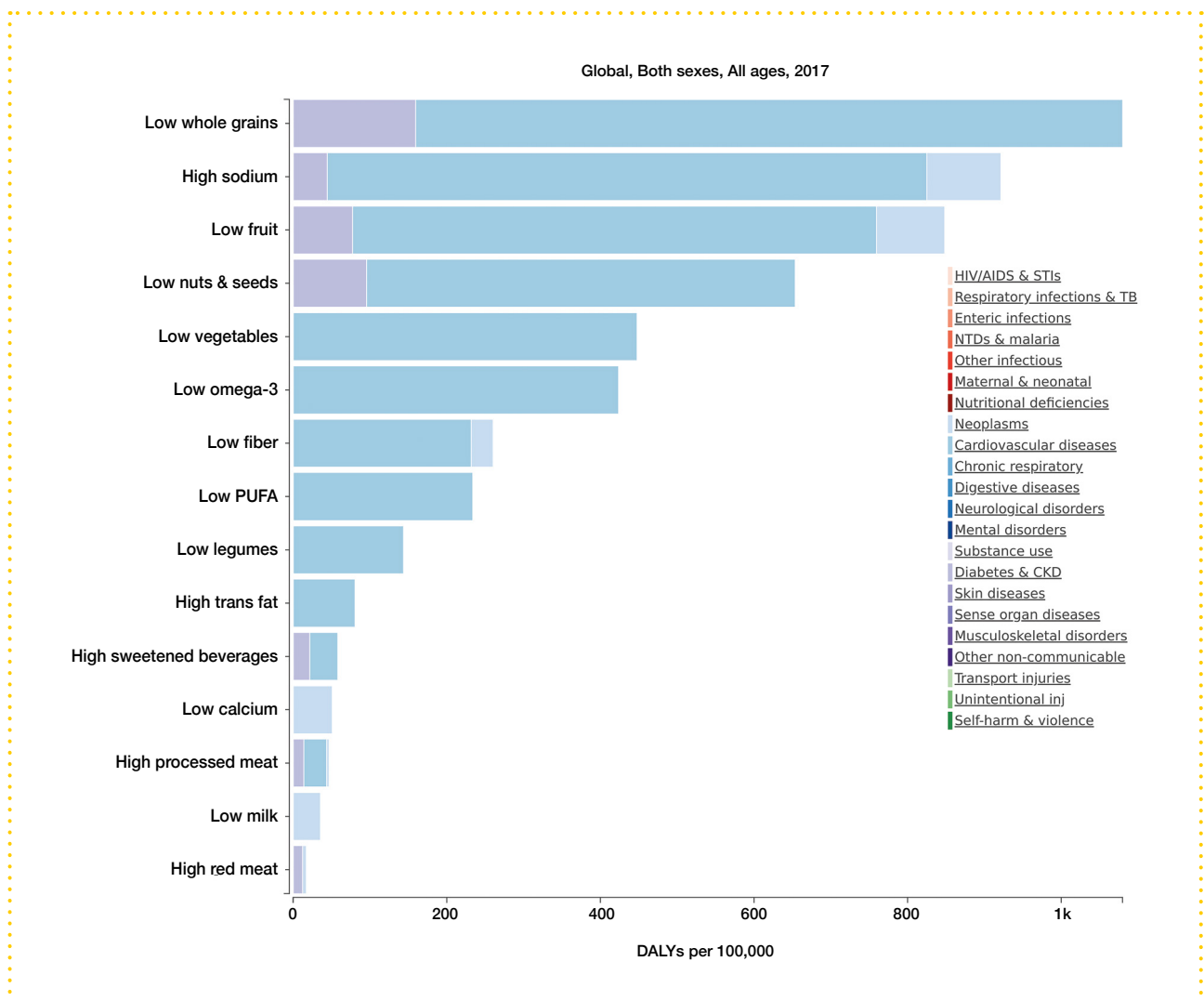


Globally, the 5 main dietary risk factors are:



1. Lack of **whole grains**.
2. Excess **salt**.
3. Lack of **fruit**.
4. Lack of **nuts and grains**.
5. Lack of **vegetables**.

MAIN DIETARY RISK FACTORS that reduce disability-adjusted life expectancy



- **The plant-based component, a major public health player**

Whether we look at the GBD data globally, or in certain regions of the world (such as certain regions of the World Health Organisation [WHO] below), one thing is clear: **insufficient consumption of vegetable-based foods (whole grains, fruits, nuts and grains, and vegetables) is clearly a major factor that affects disability-adjusted life expectancy.**

If we add the DALYs attributed to low fruit consumption to those attributed to low vegetable consumption, **insufficient fruit and vegetable consumption becomes the main dietary risk factor.**

TOP 10 DIETARY RISK FACTORS

in different WHO regions, in descending order (GBD 2017)

RANKING	EUROPE	AMERICAS	EASTERN MEDITERRANEAN
1	Lack of whole grains	Lack of whole grains	Lack of whole grains
2	Lack of fruit	Lack of nuts and grains	Lack of nuts and grains
3	Lack of nuts and grains	Lack of fruit	Lack of fruit
4	Excess of salt	Excess of salt	Lack of omega 3
5	Lack of omega 3	Lack of vegetables	Lack of vegetables
6	Lack of vegetables	Lack of omega 3	Excess of salt
7	Lack of pulses	Lack of fibre	Lack of polyunsaturated fatty acids
8	Lack of fibre	Excess of sugary drinks	Lack of fibre
9	Lack of polyunsaturated fatty acids	Excess of processed meat	Excess of trans fatty acids
10	Excess of processed meat	Excess of trans fatty acids	Lack of pulses

2. Environmental and climate issues

Food systems refer to the operating rules, organisational structures, technologies and practices that determine how food is consumed, produced, processed, packaged, stored and distributed. **They are a major contributor to the emission of greenhouse gases (GHGs)** - CO₂ and non-CO₂. These emissions,

which account for 25 to 30% of total GHG emissions, are linked to **crop and livestock farming** (agriculture), **land use** and land use for agriculture, food **processing**, retail and consumption patterns, including **upstream and downstream processes** such as the manufacture of chemical fertilisers and fuel³.

GREENHOUSE GAS EMISSIONS (in gigatonnes of CO₂ equivalent per year) by sector

COMPONENT OF THE FOOD SYSTEM	EMISSIONS (Gt CO ₂ eq/year)	SHARE OF THE AVERAGE TOTAL EMISSIONS (%)
Agriculture	6,2 ± 1,9	10-12%
Land use	4,8 ± 2,4	8-10%
Downstream agricultural processes	3,8 ± 1,3	5-10%
Food systems (total)	14,8 ± 3,4	25-30%

In its August 2019 report, the IPCC draws attention to the importance of better land management, but also to the fact that reducing GHG emissions from all sectors is essential to keep temperature increases globally well below 2°C. The aim is to use land to guarantee food security, in particular by growing suitable crops, and through afforestation. According to the *Special Report on Climate Change and Land*, **the planet will be able to respond better to climate change by focusing on sustainability.**

“When land is degraded, it becomes less productive, restricting what can be grown and reducing the soil’s ability to absorb carbon. This exacerbates climate change, while climate change in turn exacerbates land degradation in many different ways...”

- **Food, sustainability and environment: what are the links?**

Food systems have the potential to feed human health and support sustainability, but currently they are a threat to both. While overall caloric availability has relatively kept pace with population growth, there are **glaring imbalances** between, on the one hand, over 800 million people who do not have access to sufficient food, and, on the other, many more who overeat food of poor nutritional quality, resulting in an increase in obesity and many associated conditions.

The EAT-Lancet Commission, which brought together 37 experts from 16 countries, addressed the challenge of feeding the 10 billion people who will inhabit the

planet in 2050 in a healthy and sustainable way⁴. It took into account climate change, declining biodiversity, water resources, and the nitrogen and phosphorus cycles. It calls for a **global transformation of food systems that are too often driven to produce, but not in a sustainable manner**. It also proposes food benchmarks that meet the nutritional needs of all the people in a realistic and achievable manner from a production point of view.

3. Malnutrition, undernutrition and climate change are also interlinked

In 2019, for the first time, obesity, undernutrition and climate change were recognised as issues that are not independent of one another and instead require some common responses. **This is what has emerged from the report entitled, *The Global Syndemic of Obesity, Undernutrition, and Climate Change*⁵.**

Overconsumption of energy contributes to an **unnecessarily high production of GHGs**. In addition, our increasingly **sedentary lifestyle** leads to an **increase in the use of transportation** and as a result, a rise in GHG emissions, which contribute to climate change.

On the other hand, **climate change is likely to exacerbate undernutrition** and malnutrition as it increases food insecurity, and climate change could lead to higher costs for commodities such as fruit and vegetables, and make it more profitable to produce processed foods of lower nutritional quality.

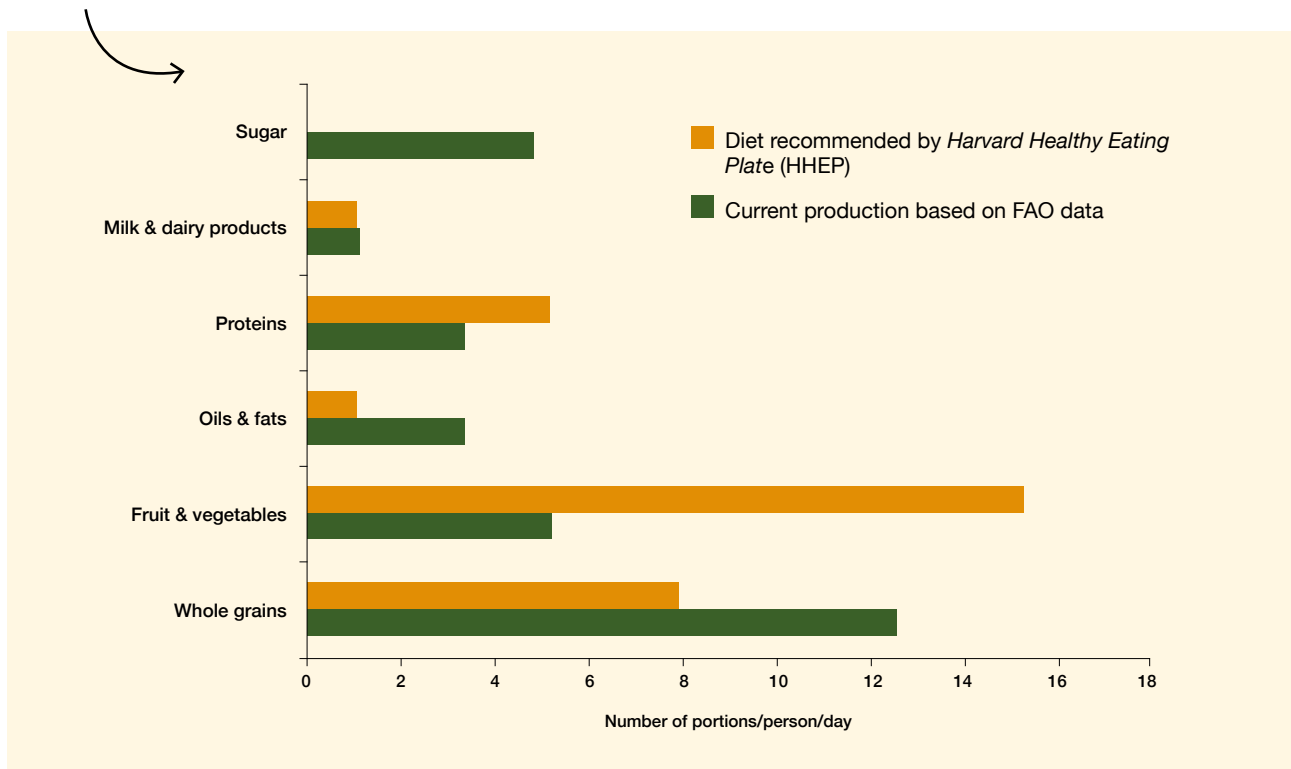
“ The challenge of making food systems **more sustainable** is a major one, and it affects the health of both humans and the planet.. ”

4. Global food production and nutritional requirements: what is not right?

A key condition for a balanced diet, i.e. one that meets the nutritional recommendations, is to have an **adequate food supply**. This does not currently seem to be the case. In fact, researchers at the University of Guelph (Canada) examined the adequacy between the global food production and the fulfilment of the recommended dietary intakes⁶. Their findings show that the **global agricultural system overproduces cereals, fats and sugars, while the production of fruit, vegetables and proteins is insufficient** to meet the nutritional needs of the current population.

The researchers estimate that correcting this imbalance –i.e. adapting the quantities produced without changing their nature– could reduce the area of arable (i.e. cultivatable) land used by agriculture by 51 million hectares. However, it would increase the total area used by agriculture by 407 million hectares, while increasing GHG emissions. According to their calculations, given the growing population, **the only way to have a nutritionally balanced diet, save land and reduce GHG emissions is to consume and produce more fruit and vegetables while moving towards a diet that includes more vegetable proteins.**

OVERALL PRODUCTION versus RECOMMENDED CONSUMPTION ⁶



5. Consumption of plant-based foods

- What are plant-based foods?

These foods include the following groups:

TYPES OF PLANT-BASED FOODS	MAIN NUTRITIONAL PROPERTIES
Fruits and vegetables	<ul style="list-style-type: none"> • Dietary fibre, vitamins, minerals • Few proteins and lipids
Cereals and pseudo-cereals	<ul style="list-style-type: none"> • Complex carbohydrates, vegetable proteins, fibre, B vitamins, minerals • Low fat
Roots and tubers	<ul style="list-style-type: none"> • Complex carbohydrates, vegetable proteins, fibre
Pulses	<ul style="list-style-type: none"> • Vegetable proteins, complex carbohydrates, fibres, minerals
Oil seeds (including oleaginous fruits)	<ul style="list-style-type: none"> • Unsaturated fats, fibre, vitamin E, minerals
Others: seaweed, flowers, herbs, chocolate, coffee, tea, spices,...	<ul style="list-style-type: none"> • Depending on the source

Plant-based foods are an extensive category offering a very wide variety of flavours, textures and colours, as well as numerous nutritional benefits. However, a primarily plant-based diet does not exclude animal products.

- The role of plant-based foods in the diet⁷



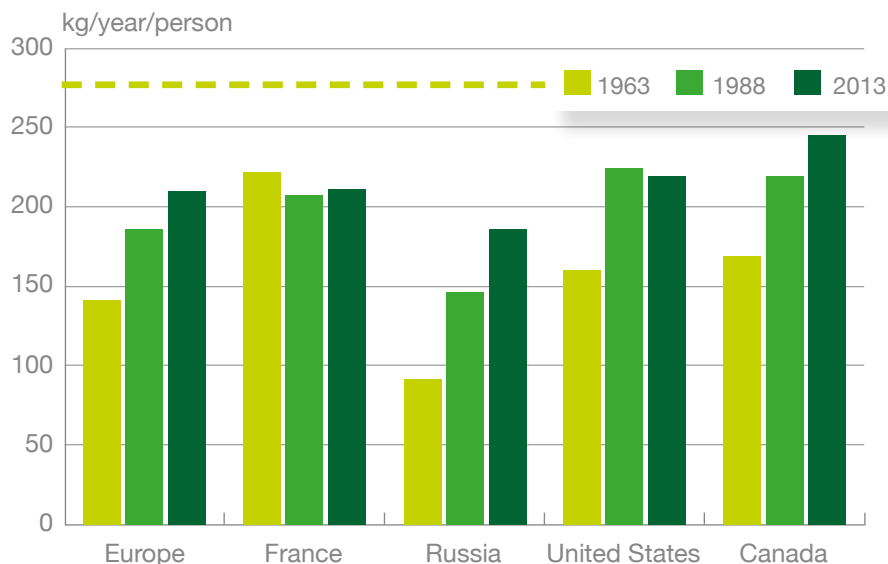
Since 2003, **the WHO has recommended the daily consumption of at least 400 g of fruits and vegetables** (excluding starchy foods such as potatoes) to prevent chronic diseases, including heart disease, cancer, type 2 diabetes and obesity. Increased fruit and vegetable consumption can also help replace excessive consumption of foods high in saturated fat, sugar and salt.

However, the analysis of consumption data carried out by the *Louis Bonduelle Foundation* in 2019 reveals that in many countries/regions around the world, the consumption of plant-based foods is still well below the recommendations. All the results are available in the monography below.

[DOWNLOAD THE MONOGRAPHY](#)

KEY FIGURES:

the consumption of plant-based foods is increasing, but it is still below the recommendations



Gross consumption of fruit and vegetables in 1963, 1988 and 2013 in the geographical areas studied (in kg/year/person).

The dotted line indicates the national average recommended intake, i.e. approximately 150 kg/year/person for vegetables and 120 kg/year/person for fruit according to the previously calculated values, i.e. a total of 270 kg/year/person.

In **Europe**, over the last few years, **the consumption of fruit and vegetables has increased overall from 85 kg to 115 kg/year/person** for vegetables and from 49 kg to 95 kg/year/person for fruit. Nevertheless, consumption levels remain below the international recommendations.

The average consumption of plant-based foods was calculated for a standardised energy intake of 2,000 kcal/day in 4 European countries: it is 451.1 g/day in the Czech Republic, 508.8 g/day in France, 513.7 g/d in Denmark and 693.4 g/day in Italy⁸.

In **Russia**, the share of plant-based foods was 46% in 2013, of which 35% was cereals, 5% were fruit and vegetables, 6% were roots and tubers and 1% were pulses. **Fruit and vegetable consumption has increased overall in the last 50 years**, from 75 kg to 113 kg/year/person for vegetables, and from 18 kg to 69 kg/year/person for fruit. Here too, both fruit and vegetable consumption levels remain below the international recommendations.

In the **United States**, the plant-based portion of the diet was 31% of the total energy intake in 2013, of which 22% were cereals, 5% fruit and vegetables, 3% roots and tubers and 1% pulses. Here too, **fruit and vegetable consumption has increased in the last 50**

years, from 94 kg to 114 kg/year/person for vegetables and from 81 kg to 108 kg/year/person for fruit. In 2013, the consumption of fruits and vegetables in America was 600 g/day/person, which is equivalent, after correction for the conversion factor between gross weight and consumed weight⁹, to 360 g/day/person, which is still below the WHO recommendation (400 to 800 g of fruit and vegetables/day/person).

In **Canada**, 40% of the total energy intake in 2013 was of plant origin, of which 26% was cereals, 6% fruits and vegetables, 4% roots and tubers and 3% pulses. **Fruit and vegetable consumption has increased overall in the last 50 years**, from 81 kg to 108 kg/year/person for vegetables and from 96 kg to 136 kg/year/person for fruit.

Plant-based foods appear to be gradually taking or regaining the lead over animal foods, which is evident in both North America and the European Union. Nevertheless, **overall, the consumption of fruit and vegetables is still insufficient compared to the international recommendations. These are the main plant-based foods whose consumption should be promoted.**

PART 2

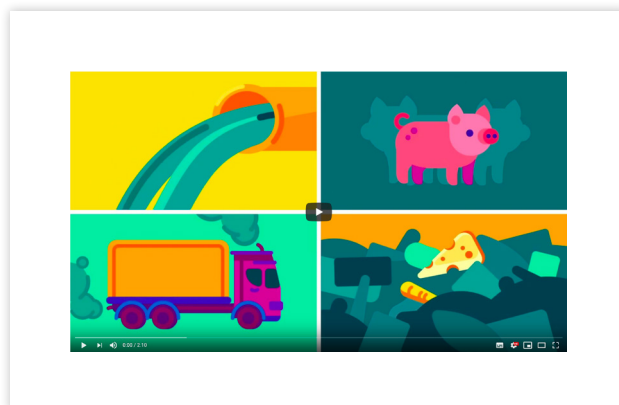
Plant-based foods at the heart
of the recommendations



1. How to feed the world sustainably









How can we feed humanity in a healthy and sustainable way? This is the issue the *EAT-Lancet* Commission worked on for 3 years¹⁰. In this vast project, the experts integrated different parameters into their research, such as the nitrogen and phosphorus cycles, climate change, the decrease in biodiversity and water resources.

Their work resulted in the development of an **ideal ‘plate’ that reconciles nutrition and sustainability**. It includes a generous and varied amount of plant-based foods: whole grains, vegetables and fruit, pulses and nuts together account for nearly 850 g per day. The *EAT-Lancet* plate contains relatively few animal products, but is not exclusively plant-based. It favours unsaturated fats over saturated fats, and limits the amount of refined cereals, highly processed foods and added sugars.



[WATCH THE VIDEO](#)

TARGETS FOR A HEALTHY DIET for the whole planet (based on 2,500 kcal/day)

	MACRONUTRIENT INTAKE GRAMS PER DAY <i>(possible range)</i>	CALORIC INTAKE <i>(kcal/day)</i>
 Whole grains • Rice, wheat, corn and other	232	811
 Tubers or starchy vegetables • Potatoes and cassava	50 (0-100)	39
 Vegetables • All vegetables	300 (200-600)	78
 Fruits • All fruits	200 (100-300)	126
 Dairy foods • Whole milk or equivalents	250 (0-500)	153
 Proteins sources		
• Beef, lamb and pork	14 (0-28)	30
• Chicken and other poultry	29 (0-58)	62
• Eggs	13 (0-25)	19
• Fish	28 (0-100)	40
• Legumes	75 (0-100)	284
• Nuts	50 (0-75)	291
 Added =fats		
• Unsaturated oils	40 (20-80)	354
• Saturated oils	11,8 (0-11,8)	96
 Added sugars • All sugars	31 (0-31)	120

SO, WHAT IS A SUSTAINABLE DIET?

According to the Food and Agriculture Organisation of the United Nations (FAO, 2010), «sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to a healthy life for present and future generations. Sustainable diets are protective

and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources»¹¹.



IN PRACTICE:

According to *Eat-Lancet*, the dishes above are examples of foods that tie in with global and sustainable diets. This is a **flexitarian diet**, which is mainly plant-based, but may contain modest amounts of fish, meat and dairy products.

2. How can these sustainability aspects be integrated into the recommendations?

For a long time, the evolution of nutrition knowledge in the development of nutritional recommendations did not take into account issues related to the environment, global resources and their sustainability.

Nutrition and sustainability used to be two separate worlds, but today it is becoming clear that this approach is not the right one, as the two topics are so intertwined.

- **The share of animal proteins**

It is clear that **animal products make up the bulk of our ecological footprint**. In France, **Solagro - Afterres 2050**^{12,13} compared different categories of diet (in particular by varying the share of animal proteins). This research shows that **diets that reduce the share of animal proteins in favour of plant-based proteins reduce their GHG footprint as well as their surface footprint. Switching from the current diet** (in France, according to the INCA2 data), which does not meet the Recommended Daily Intake (RDI), to the **same diet optimised to meet the RDI results in a 13% reduction in GHG emissions**. What's more, diets that

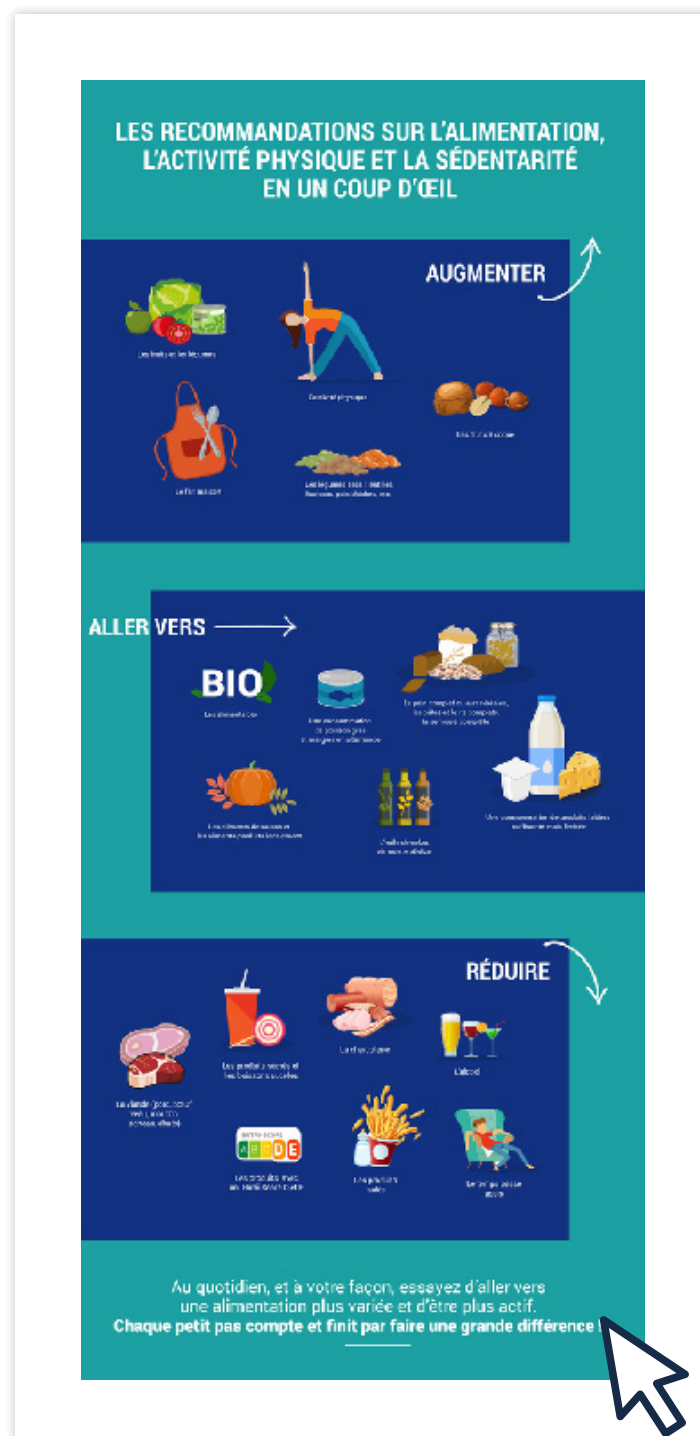
reduce protein to 60 g per day, 2/3 of which is in the form of plant-based proteins, allow for a reduction of 31 to 36%. Those that also limit total protein to 60 g per day result in a 62% reduction in GHG emissions. The impact of these diets on the land used for food production gives comparable results, with a reduction of more than 50% for the diet that contains 60 g of total protein per day.



- Evolution of the recommendations

Various initiatives have integrated the aspect of sustainability into nutritional or dietary recommendations. One example is the latest recommendations published by Santé Publique France¹⁴, the French national public health agency. In addition to limiting animal proteins (particularly meat

and processed meat), the ‘sustainability’ dimension is expressed through statements in favour of organic, home-made products and, of course, an increase in the proportion of plant-based foods, particularly fruits and vegetables, nuts and pulses.



ENJOY A VARIETY OF HEALTHY FOODS EVERY DAY.

Canada's new food guide¹⁵ does not communicate directly on the sustainability aspect, but it definitely picks up on the trend of a 'greener' diet: **fruit and vegetables should take up half of the plate**, and protein sources leave little room for meat and dairy products. It also encourages people to cook more often.

FURTHER READING:

- [\(Re\)discovering dietary guidelines](#)
- [How are today's dietary guidelines developed?](#)



L'ÉPI ALIMENTAIRE

5 PRIORITÉS

POUR MIEUX MANGER

Pensez à votre santé, mangez varié et équilibré. Voici les 5 mesures alimentaires prioritaires pour les adultes.

1. **PRODUITS CÉRÉALIERS COMPLETS**
Au moins 125 g par jour
2. **FRUITS & LÉGUMES**
Fruits: 250 g par jour
Légumes: Au moins 300 g par jour
3. **LÉGUMINEUSES**
Au moins 1x par semaine
4. **FRUITS À COQUE & GRAINES**
15 à 25 g par jour
5. **SEL**
Limitez le sel en cuisine et ne salez pas à table

Développé par Food in Action et la Haute École Léonard de Vinci sur base de l'avis n° 9584 du Conseil Supérieur de la Santé

Avec le soutien de l'AViQ et du SPF Santé Publique







In Belgium, the recent dietary recommendations by the Superior Health Council also take sustainability¹⁶ into account. This probably explains why red meat (beef, veal, pork, mutton... but excluding poultry) is limited to 300 g per week, and processed meat to 30 g per week. The graphic illustration of the 5 priority messages of these recommendations - the *Epi Alimentaire (the food branch)* - favours fresh, local and seasonal fruit and vegetables.¹⁷

DISCOVER THE FOOD BRANCH



- **The Afterres plate or the vision of the future**

The Afterres 2050 plate is a **projection of what tomorrow's diet should look like**, in a food and agricultural transition that takes account of both **public health and environmental issues**.

This plate should enable a 50% reduction in GHG emissions from agriculture. It reduces the need for crop protection products by increasing the share of organic products and it tackles overfishing

by reducing fish consumption. It also maintains a level of consistency between the consumption of dairy products and meat consumption (consumption of dairy products automatically calls for meat production). Moreover, it aims to reduce the Body Mass Index (BMI) to the level of the year 2000. Finally, it reduces the overconsumption of protein and the intake of sugar.



THE AFTERRES 2050 PLATE (g/day) and the EVOLUTION (in %) compared to the current consumption¹⁸



FOOD TYPES	AFTERRES PLATE (in g/day)	EVOLUTION COMPARED TO THE CURRENT CONSUMPTION (in %)
Bread and bread products	149	30
Breakfast cereals	5	0
Pasta	87	129
Rice and durum or cracked wheat	28	12
Pastries	4	-67
Sweet or savoury biscuits and snack bars	8	-11
Fine pastries and cakes	22	-41
Milk	60	-30
Ultra fresh dairy products	67	-18
Cheeses	14	-58
Eggs and egg products	12	-20
Butter	6	-45
Oil	24	118
Margarine and other fats	4	0
Meat	25	-50
Poultry and game	14	-56
Offal	3	0
Cold cuts	13	-62
Fish	4	-85
Crustaceans and molluscs	5	25
Vegetables (except potatoes)	187	35
Potatoes and potato products	55	-5
Pulses	119	1090
Fruit	243	69
Dried fruit and oil seeds	8	167
Ice cream and ice-cream desserts	9	-33
Chocolate	5	-17
Sugar and sugary products	12	-43
Water	817	4
Alcohol-free soft drinks	95	-32
Alcoholic drinks	83	-47
Coffee	257	2
Other hot drinks	155	20
Pizza, quiche and savoury pastries	17	-26
Sandwiches, snacks	12	-25
Soups and stocks	109	27
Ready-made meals	43	-38
Cream desserts, snacks and jellied milks	23	-8
Stewed and cooked fruit	13	0
Seasonings and sauces	30	58
Special diet foods	2	0

- **Eating for the climate**

The impact of human activity, including food systems, on climate change is increasingly well documented and has become a widely debated topic in society. **The act of eating has now also become a means of expressing one's commitment to combating climate change (or the lack thereof).** This has resulted in the creation of the term 'climatarian' to refer to people who change their diet with the primary goal of combating climate change.

In practice, climate-friendly eating means adopting a more sustainable diet, as discussed above. A major feature of such a diet is a **reduction in the proportion of animal products in favour of more plant-based foods** (fruit and vegetables, whole grains, pulses, nuts and seeds).

3. How different regions across the globe are reaching nutritional targets

If the 'ideal' plate designed to meet both nutritional and sustainability targets is to lead to food benchmarks valid for all of mankind, **the path to be taken –and therefore the changes to be adopted– obviously depends on current consumption levels.** However, these differ in the various regions of the world. According to the *EAT-Lancet* Commission¹⁹, in order to reach the target of feeding the world in 2050, at a global level, the following must be achieved:

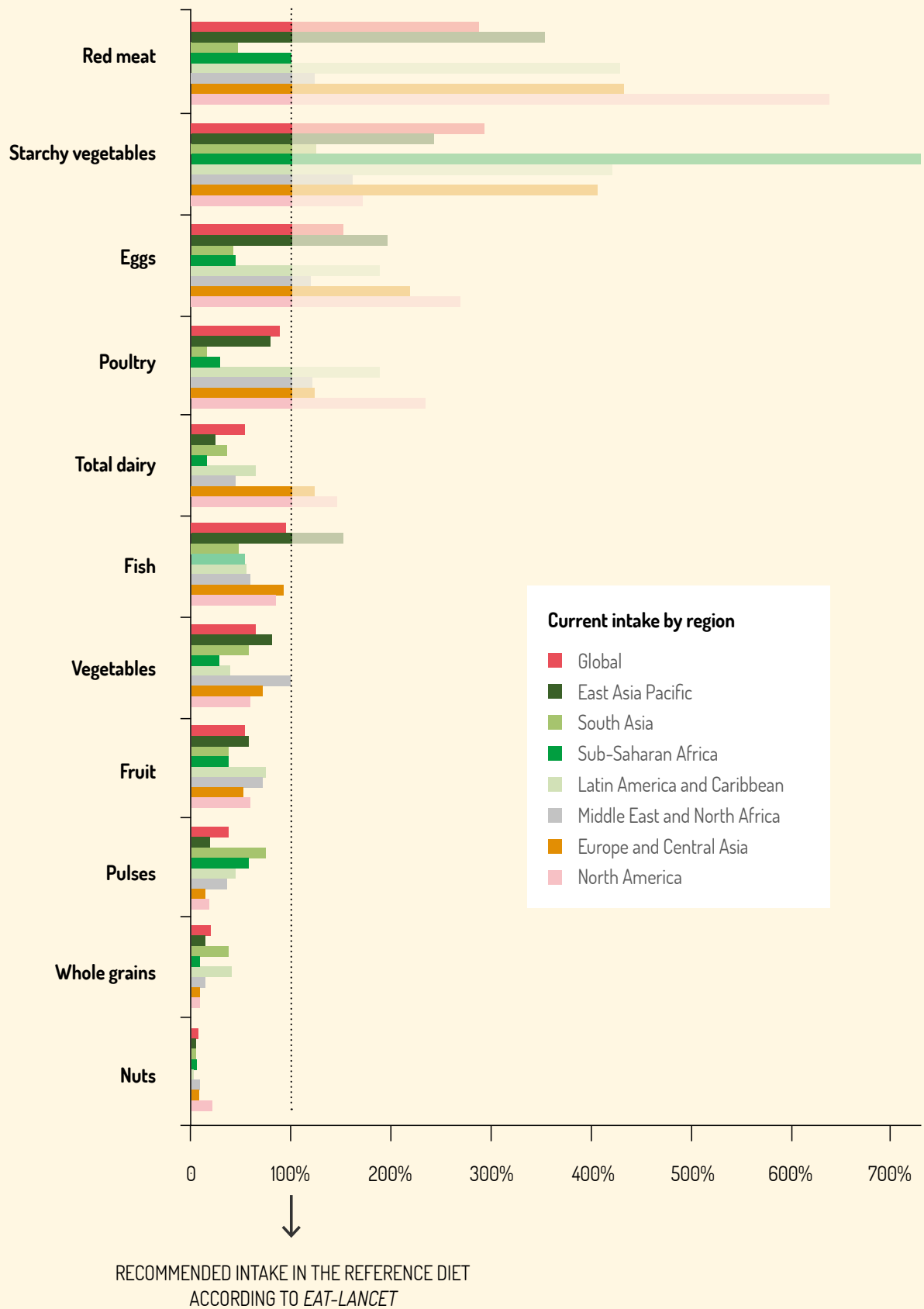
It appears that, with the exception of the Middle East and North Africa, where the vegetable consumption is in line with the targets, **all the other regions across the globe need to increase their consumption of vegetables, fruit, pulses, whole grains and nuts.**

- ↳ A **reduction** in red meat and sugar **consumption** of more than 50%.
- ↳ **Doubling** of the **consumption** of nuts, fruit, vegetables and pulses.



A LARGE-SCALE CHANGE IN DIETARY HABITS

Comparison of the current consumption with the recommended consumption levels (based on *EAT-Lancet* Commission, 2019)



4. A healthy and sustainable diet: WHO recommendations

The World Health Organisation (WHO) has also addressed the challenge of reconciling a balanced diet with the sustainable production of the foods required for that diet.²⁰ The WHO highlights that there

are many common goals that benefit both human health and the environment, and has issued a set of recommendations. Several of them stress the importance of a plant-based diet.



Eat a wide variety of foods from different food groups, especially plant-based foods.



Eat at least two to three servings of fruit every day, preferably fresh, seasonal and local. The WHO recommends consuming more than five servings (400 g) of fruit and vegetables (combined) per day.



Consume at least two to three servings of vegetables per day. Choose vegetables grown outdoors rather than in greenhouses, or preserved in a sustainable manner (e.g. by fermentation) and that do not require rapid and energy-intensive transport. Reduce waste by also eating 'ugly' fruit and vegetables - cosmetic imperfections do not mean that foods are less nutritious.



Potatoes, sweet potatoes, cassava and other starchy roots do not count as vegetable servings, but should be included in a healthy diet, preferably in minimally processed forms.



Cereals should be consumed primarily as whole grains - such as unprocessed corn, millet, oats, wheat or brown rice - rather than refined (e.g. white rice, white bread or refined pasta).

Limit the consumption of red meat and processed meat products - some national and international bodies suggest limiting cooked red meat to about 500 g per week. Consume very little or no processed meat.



Eat pulses regularly. Dried beans, peas and lentils are excellent sources of protein, fibre and other nutrients, and they are naturally low in fat. Pulses are a good alternative to meat, and can play a key role in the healthy, sustainable diets of the future.

5. Towards more sustainable food systems

Human evolution has entered a new geological era, defined by a predominant and profound human impact on the earth's ecosystems and climate: the **Anthropocene**. Human sustainability on Earth implies changes in many respects, including a transformation of food systems. The **Beacons of Hope** initiative, led by

the *Global Alliance for the Future of Food*, focuses on understanding critical issues related to food systems. It proposes a kind of toolkit for transforming food systems, built on the principles of sustainability, health, equity, resilience, diversity and interdependence²¹.

Beacons of Hope provides inspiring examples and evidence that global transformation is possible.

TEN KEY MESSAGES HAVE EMERGED FROM THIS INITIATIVE.

FOOD SYSTEMS TRANSFORMATION TOOLKIT

***beacons of hope**
TRANSFORMING FOOD SYSTEMS

This Toolkit includes a Food Systems Transformation Framework and Discussion Guide. It can be used to analyze and explore the transformation process, learn about the experiences of diverse Beacons of Hope, and facilitate discussion and action that accelerates food systems transformation.

TRANSFORMATIONS > THE FRAMEWORK > DISCUSSION GUIDE >

PART 3

Plant-based diets in practice²²



1. How efficient are the different actions? The example of children's education

Encouraging children to eat more vegetables is definitely possible. But only if you take the right, well-thought-out steps, aimed at the right audience. In 2019, the *Louis Bonduelle Foundation* unveiled the [monography 'How to get children to eat more vegetables'](#).

It not only proposes ideas, but also explains how they should be implemented. It also analyses the expected results of different types of action, **all of which are the result of 17 international scientific studies measuring their impact, which form the basis of this publication.** We invite you to consult the entire publication for more details.

ITS KEY FINDINGS ARE THE FOLLOWING:



- The most effective approach to increase the vegetable consumption in children **combine a range of different actions.**



- **Expose children to fruits and vegetables repeatedly**, in many different ways, to encourage them to discover and try them.



- **Gardening and nutrition education:** this combination of activities is one of the most effective ways to increase daily fruit and vegetable consumption significantly, whereas stand-alone nutrition education programmes appear to be far less effective or even entirely ineffective.



- **Pre-schoolers and children up to 5-6 years of age** are the most receptive to gardening activities.

- **Gardening and cooking:** this combination of sensory activities also boosts the consumption of fruit and vegetables, but it appears to be less effective than the combination of gardening and nutrition education.



- **Cooking and tastings:** this duo of sensory activities results in children favouring vegetables over fruit.



- **Cooking and nutrition education:** this combination of activities is also one of the most effective; it is both educational and an experience as such. It improves nutritional knowledge, increases exposure to new foods and encourages long-term behavioural changes within families. The easier the recipes, the greater the success of this initiative.



- **Tastings and nutrition education:** stand-alone nutrition education initiatives are effective, but they are even more effective when coupled with tastings. The sensory aspect is therefore a factor in boosting fruit and vegetable intake. Repeated tastings (especially for vegetables) are also essential, as is the variety of fruit and vegetables to be discovered.



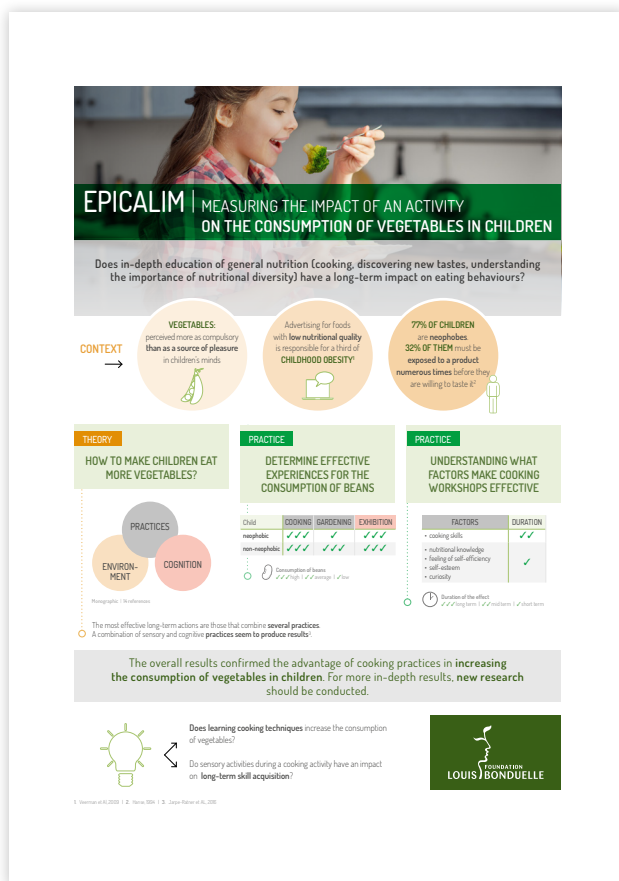
- **What types of activities should be combined?** The key to success is to combine several activities that integrate cognitive, sensory and environmental components (both at school and at home).



2. EPICALIM: our analysis of the real impacts of preventive actions

In addition to our literature review, we have also conducted various research projects focusing on children²² in order to **measure the effectiveness of field actions and to understand their determining factors**. This research programme bears the acronym **EPICALIM** (étude sur l'alimentation menée au musée *Epicurium* - study on nutrition conducted at the *Epicurium museum*) and was conducted in collaboration with the Institut de Tourisme et d'Hôtellerie du Québec (ITHQ) and the *Epicurium museum*.

Its main findings, the culmination of two years of research, as summarised in the infographic below, reveal that:



- ↳ **Actions that combine several activities** (culinary activities and nutrition education) allow for a significant increase in the consumption of vegetables in children.
- ↳ The consumption of a family of plants that is regularly shunned by children, **pulses**, increases significantly **following a practical workshop** (gardening or cooking).
- ↳ The impact of a cooking workshop varies according to the **child's level of neophobia**.
- ↳ A **cooking workshop has a greater impact** on the consumption of pulses in the neophobic child than a gardening workshop.
- ↳ Hands-on workshops boost **the consumption of new products** in many ways.
- ↳ Cooking allows for the **development of new skills** in children, such as a sense of self-efficacy, self-confidence and curiosity.
- ↳ Finally, several studies have revealed that **enjoyment is the main motivating factor in children**.

DISCOVER THE **INFOGRAPHIC**



THE PLEASURE OF VEGETABLES:
DISCOVER **GREAT TIPS** FROM
ARIANE GRUMBACH

OTHER USEFUL DOCUMENTS:

- [Five tips for familiarising children with vegetables](#)
- [More vegetables: 5 practical tips for children](#)

VIDEO ON THE BENEFITS OF VEGETABLES



3. Extending research with our field actions

After more than 10 years of calls for projects and research support, notably via the [Louis Bonduelle Research Award](#), and given the promising results of projects such as EPICALIM, **we decided to amend our funding system into a support mechanism for participatory research.**

Indeed, beyond studies by academic institutions, experience has shown that projects have all the more impact when they are carried out by multiple players. Participatory research thus enables partners from different sectors (academic and civil society) to work together to jointly build a project that makes sense for the field and for research.

KEEN TO [FIND OUT MORE?](#)



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